

Hoplolaimus indicus, an Ectoparasitic Nematode
Pathogenic to Citrus in India

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INTRODUCTION

There are presently 20 species of nematodes known to be pathogenic to citrus (6). Ten of these species are ectoparasitic nematodes which move outside the roots in the soil and penetrate root cells with only their stylet. Hoplolaimus indicus Sher is one of these ectoparasitic nematodes that is known to cause the decline of citrus and other crops.

DISTRIBUTION AND HOSTS

Hoplolaimus indicus, one of the lance nematodes, is widely distributed in India but is not known to occur in other regions of the world. At least 33 hosts have been reported (5). Hosts on which H. indicus reproduces well are lemon [Citrus limon (L.) Burm. f. 'Rough'], mandarin orange (C. reticulata Blanco), sweet orange [C. sinensis (L.) Osbeck], kharna khatta (C. karna Raf.), trifoliate orange [Poncirus trifoliata (L.) Raf.], bermudagrass (Cynodon dactylon L.), cauliflower (Brassica oleracea L.), tomato (Lycopersicon esculentum Mill.), corn (Zea mays L.), and sugarcane (Saccharum officinarum L.) (4).

BIOLOGY AND ECOLOGY

The life cycle of H. indicus is similar to that of most other plant parasitic nematodes, having four larval stages and four molts which occur during development from egg to adult nematodes. On grain sorghum [Sorghum bicolor (L.) Moench], the life cycle of H. indicus is completed in 27-36 days, at temperatures of 28-32 C (1). Feeding is essential for the development of all stages outside the egg. Both males and females are present, and reproduction is bisexual. Females must feed for 72 hours prior to egg laying. Hoplolaimus indicus feeds primarily as an ectoparasite on cortical cells of feeder roots (3). Studies on soil factors affecting reproductive rates of H. indicus showed that on tomato growing in sandy loam soil, optimum conditions for population increase occurred at 30 C, pH7, and 16% moisture.

Hoplolaimus indicus is also known to interact with Fusarium moniliforme Sheldon, on corn, Zea mays. This fungus failed to cause a wilting of corn except in the presence of H. indicus (7).

SYMPTOMS AND EFFECTS ON CITRUS

In India, high populations of H. indicus were found in citrus groves with declining yields (8). Greenhouse studies confirm that this nematode may greatly reduce the growth of sweet orange (C. sinensis) and lemon (C. limon 'Rough'). Shoot lengths and fresh shoot weights of sweet orange and lemon were reduced as

much as 70% when plants were inoculated with H. indicus. Hoplolaimus indicus also reduced the top growth of mandarin orange (C. reticulata), kharna khatta (C. karna), and trifoliolate orange (P. trifoliata). For all species of citrus tested, a consistent linear decrease in growth was observed with an increase in the number of nematodes used in initial inoculations. This demonstrates that this nematode is pathogenic to a number of species of citrus and supports field observations of its association with citrus decline (2).

Plants inoculated with H. indicus had discolored feeder roots and this was particularly severe in C. limon 'Rough', C. karna, and C. sinensis. In some species of citrus, H. indicus causes interveinal chlorosis of leaves and dieback of twigs (4).

SURVEY AND DETECTION

Because H. indicus is an ectoparasitic nematode, soil surrounding roots of potential hosts showing decline should be submitted for laboratory analysis.

Symptoms associated with this nematode are root necrosis, interveinal chlorosis, and twig dieback.

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